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PATENT APPLICATION
Mo-4532
LeA 31,223

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICATION OF) GROUP: 1207
FRANK RICHTER ET AL)
SERIAL NO.: 08/713,905)
FILED: SEPTEMBER 13, 1996)
TITLE: PROCESS FOR THE PRODUCTION)
OF THER ISOCYANATES)

LETTER

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Enclosed herewith are three copies of an Appeal Brief in the matter of the subject Appeal. Please charge the fee for filing the Brief, \$310.00, to our Deposit Account Number 13-3848.

Respectfully submitted,

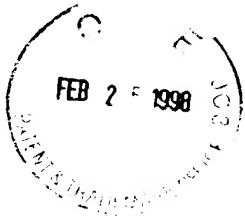
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Name of applicant, assignee or
Registered Representative: Lyndanne M. Whalen, Reg. No. 29,457
Date: February 23, 1998
Date: February 23, 1998





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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF)
FRANK RICHTER ET AL) GROUP NO.: 1207
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SERIAL NUMBER: 08/713,905) EXAMINER: R. SERGENT
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TITLE: PROCESS FOR THE PRO-)
DUCTION OF ETHER ISO-)
CYANATES)

APPEAL BRIEF

Assistant Commissioner for Patents

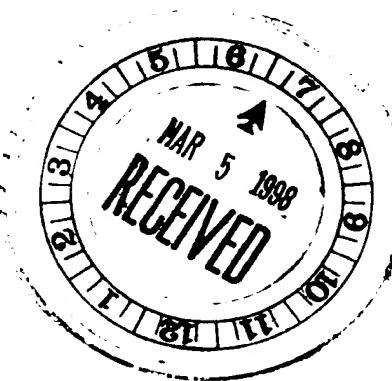
Washington, D.C. 20231

Sir:

This Brief, submitted in triplicate, is an appeal from the Final Action of the Examiner dated August 28, 1997 in which the rejections of Claims 1-2 and 3-4 (all of the claims) were maintained.

I. REAL PARTY IN INTEREST

Each of the named inventors has assigned his interest in the present application to Bayer Aktiengesellschaft, a German corporation. The real party in interest is therefore Bayer Aktiengesellschaft.



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Lyndanne M. Whalen, Reg. No. 29,457

Name of applicant assignee or
Registered Representative

Lyndanne M. Whalen
Signature

February 23, 1998

Date

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II. **RELATED APPEALS AND INTERFERENCES**

Appellants would direct the Board's attention to U.S. Serial Number 08/503,580, filed July 18, 1995 in which a Brief appealing the Final Action of the Examiner was filed on May 2, 1997.

U.S. Serial Number 08/503,580 is directed to a process for the gas phase phosgenation of amines which Appellants believe is distinguishable from the invention being claimed in the present application. However, if the Board were to consider a process for the phosgenation of amines equivalent to a process for the phosgenation of ether amines, the Board's decision in U.S. Serial Number 08/503,580 could have a bearing upon the Board's decision in this appeal.

III. **STATUS OF CLAIMS**

Claims 1-4 remain pending and are the subject of this appeal.

IV. **STATUS OF AMENDMENTS**

No amendments to the claims have been made or requested subsequent to the Final Action of the Examiner.

V. **SUMMARY OF THE INVENTION**

The present invention relates to a process for the production of ether (poly)isocyanates in which an ether (poly)amine is reacted with at least a stoichiometric amount of phosgene in the vapor phase at a temperature of from about 50 to about 800°C under pressure. The present invention also relates to specific ether isocyanates having a hydrolyzable chlorine content of less than 0.1% which are produced by this phosgenation process and to a process for the production of urethanes from these specific, low hydrolyzable chlorine content ether isocyanates.

VI. **ISSUES**

- A. Claims 3 and 4 stand rejected under 35 U.S.C. § 112, first paragraph on the basis that they contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. The specific basis for

this rejection is the limitation that the ether isocyanate of Claim 3 must have a hydrolyzable chlorine content of less than 0.1%.

B. Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lehmann et al (U.S. Patent 3,267,122) in view of Joulak et al (U.S. Patent 5,391,683) or Biskup et al (U.S. Patent 5,449,818) or Bischof et al (U.S. Patent 5,516,935).

VII. GROUPING OF CLAIMS

The basis for the rejection of Claims 1 and 2 is completely different from the basis upon which Claims 3 and 4 are rejected. The claims do not therefore stand or fall together.

VIII. ARGUMENTS

A. Appellants' specification does support the hydrolyzable chlorine content of less than 0.1% limitation of Claim 3.

Appellants cited Example 1 in their specification as support for the limitation of less than 0.1% hydrolyzable chlorine which is recited in Claim 3 as amended.

The Examiner has argued that the disclosure within Example 1 and the statement in the comparative examples that the chlorine content was not below 0.1% cannot provide support for the content of compositions of the instant invention.

Appellants maintain that support for the hydrolyzable chlorine content limitation is found throughout their specification and that Example 1 was specifically cited because it demonstrates an ether polyisocyanate having such a low hydrolyzable chlorine content.

More specifically, it is readily apparent from the discussion at page 1 lines 28-29 of Appellants' specification that a residual hydrolyzable chlorine content of 0.1% is considered very high by those skilled in the art. At page 1, lines 29-30 of the specification, it is stated that these high hydrolyzable chlorine contents make it difficult to use the polyisocyanate. At page 1, line 29 through page 2, line 1 of Appellants' specification, it is taught that isocyanates having high hydrolyzable

chlorine contents are not useful for preparing non-discoloring raw materials for coatings.

In view of this discussion of the problems encountered with isocyanates having hydrolyzable chlorine contents of greater than 0.1%, one of the stated objects of Appellants' invention is "to provide a process for the production of high quality isocyanates containing ether groups." (page 3, lines 17-18 of the specification.) This object is said to be achieved by the process of the present invention. (page 3, lines 22-25) Appellants' Examples support these statements. The results reported in the comparative examples demonstrate that known phosgenation methods outside the scope of the claimed invention do not achieve the less than 0.1% hydrolyzable chlorine levels of the claimed invention.

One skilled in the art reading Appellants' specification in its entirety would therefore readily appreciate that Appellants had indeed invented a process for producing isocyanates which do not have the high hydrolyzable chlorine contents known to be problematic in prior art processes (i.e., hydrolyzable chlorine contents of 0.1% or greater) at the time the present application was filed.

An adequate description under 35 U.S.C. §112, first paragraph does not require literal support for the claimed invention. It is sufficient if the originally-filed disclosure would have conveyed to one having ordinary skill in the art that an applicant had possession of the concept of what is claimed. Ex parte Parks, 30 USPQ2d 1234 (BPAI 1994).

The subject matter being claimed in Claims 3 and 4 is described in Appellants' specification in a manner which would convey to one skilled in the art that Appellants had invented a process for producing isocyanates with hydrolyzable chlorine contents of less than 0.1% at the time their application was filed. Appellants' specification does therefore satisfy the description requirement of 35 U.S.C. § 112, first paragraph.

B.(1) Claims 1 and 2 are not rendered obvious by the teachings of Lehmann et al taken in view of Joulak et al.

(a) The teachings of Lehmann et al are not consistent with the Examiner's position.

Lehmann et al discloses a process for the production of ether isocyanates in which amines corresponding to a specified formula are phosgenated either by the known cold phase-hot phase phosgenation or by the known hydrochloride process. A key feature of the Lehmann et al process is the use of the specific amine starting material required therein.

Lehmann et al teaches that one of the problems encountered with phosgenation of ether diamines is the production of large quantities of ether cleavage products. (at col. 1, lines 16-18) Lehmann et al "resolved" this problem by selecting specific diamine starting materials. Lehmann et al makes it quite clear that the required diamine starting materials are critical to that reference process by stating:

Only when using certain amines (as above defined in the formula) will the corresponding isocyanate be formed in desirable yields.
at column 1, lines 55-57. (emphasis added)

Contrary to this teaching of Lehmann et al, Appellants' claimed process is **not limited** to the amines required for the reference process. Appellants have found that use of specific diamines is **not** necessary when vapor phase phosgenation of any ether amine in accordance with their claimed process is carried out.

Joulak et al discloses a process for the preparation of aromatic polyisocyanates by reacting an aromatic diamine or polyamine with phosgene in the gaseous phase.

Joulak et al **does not** teach or suggest that an ether diamine or polyamine could be phosgenated by the disclosed process.

The Examiner's rejection is based upon two erroneous assumptions: (1) that the ether amines of Lehmann et al are equivalent to the aromatic amines disclosed by Joulak et al in a gas phase phosgenation process; and (2) any amine can be

successfully phosgenated in the gas phase. These assumptions are not, however, consistent with the teachings of Lehmann et al.

More specifically, Lehmann et al makes it clear that the problems encountered in phosgenating ether amines are unique and are **not** encountered when other types of amines are phosgenated. At column 1, lines 16-18, for example, Lehmann et al states:

It is also known that diamines which contain ether groups upon phosgenation yield mainly ether cleavage products.

At column 2, lines 24-29, Lehmann et al teaches:

Again for best results and highest yield, it is preferred that **not too high a temperature** for the phosgenation be used. (emphasis added)

Temperatures of up to 170°C are reported in the Examples.

Appellants submit that one skilled in the art reading these teachings of Lehmann et al would **not** consider it obvious to conduct the Lehmann et al phosgenation process in the vapor phase (i.e., at temperatures exceeding the 300°C minimum employed in the Joulak et al reference).

Joulak et al does not include any teachings with respect to ether amines and can not therefore rebut these teachings of Lehmann et al. Further, no other authority which rebuts these teachings of Lehmann et al has been cited.

The assumptions upon which the Examiner's rejection is based are not therefore supported by the cited references or by any other authority. The suggested combination of Lehmann et al and Joulak et al does not therefore establish a proper *prima facie* case of obviousness.

B (1)(b) Appellants' claimed process does not require the specific ether amines taught to be critical by Lehmann et al.

One skilled in the art combining the teachings of Lehmann et al and Joulak et al would "arrive at" a process for phosgenating the specific ether amines required by Lehmann et al. Appellants' process is not, however, limited to those ether amines.

Appellants' ability to use any ether (poly)amine represented by Formula I in their claimed process without sacrificing isocyanate product yield could not possibly have been expected in view of Lehmann et al's teaching that only the specific ether amines disclosed therein could be phosgenated to produce the corresponding isocyanate in high yield.

The Examiner has argued (at page 4, line 16 through page 5, line 2 of the Final Office Action) that Appellants' argument with respect to differences between the Lehmann et al diamines used as starting materials and the diamine starting materials of the present invention is without merit because the instant claims encompass the diamines of Lehmann et al.

This argument is contrary to the teaching of Lehmann et al that selection of the specific amines required therein is a critical feature of that reference process. (at column 1, lines 55-57 of Lehmann et al)

All teachings of a reference (even those which do not support the Patent Office's position) must be considered in determining the obviousness of a claimed invention. The Examiner can not therefore ignore Lehmann et al's teaching that the specific ether amines required therein are critical because Appellants have found that this teaching of the reference does not apply to their claimed invention.

An invention which does not require a feature or material taught by the prior art to be critical can not be rendered obvious by that prior art. Appellants' invention which does not require the specific ether amines critical to Lehmann et al can not therefore be considered obvious in view of the teachings of Lehmann et al in combination with Joulak et al (which is silent with respect to ether amines).

B (1)(c) Appellants' process produces ether isocyanates in yields which are significantly higher than any of the yields reported by Lehmann et al.

One skilled in the art attempting to phosgenate the Lehmann et al ether amines in the vapor phase (as taught by Joulak et al) would expect to obtain ether isocyanate yields lower than those achieved by Lehmann et al's liquid phase phosgenation in view of Lehmann et al's teachings with respect to high

temperatures and ether cleavage products.

Contrary to this expectation, Appellants' vapor phase phosgenation process produces ether isocyanates in yields ranging from 96.8% to 99.5% which are significantly higher than the 65% to 81% yields obtained by Lehmann et al in the disclosed process.

B.(2) The combined teachings of Lehmann et al and Biskup et al do not render Appellants' claimed process obvious.

(a) The teachings of Lehmann et al and Biskup et al are not consistent with the Examiner's position.

As has already been discussed, Lehmann et al teaches that phosgenation of ether amines at elevated temperatures produces high yields of unwanted ether cleavage products. The elevated temperatures to which Lehmann et al attributes this production of high yields of by-products include those temperatures used by Biskup et al to phosgenate amines in the vapor phase.

Biskup et al discloses a process for the preparation of aromatic diisocyanates in which the corresponding diamine is phosgenated in the gaseous phase. The aromatic diamines useful in this disclosed process are represented by the formula



in which the R group represents a hydrocarbon residue containing at least one aromatic system and may have additional residues such as alkyl groups, halogen atoms or ether groups.

Biskup et al does **not**, however, include any teachings which are specific to the temperature-sensitive ether amines taught by Lehmann et al. Nor does Biskup et al address the issue of by-products formed as a result of ether cleavage.

It would not therefore be possible for one skilled in the art seeking to develop a process for producing ether (poly)isocyanates in high yields to determine that vapor phase phosgenation of an ether amine would produce the desired ether isocyanate rather than the large quantities of ether cleavage by-products which Lehmann et al teaches would be formed.

B. (2)(b) The teachings of Lehmann et al and Biskup et al can not be combined in any manner to "arrive at" Appellants' claimed invention.

One skilled in the art combining the teachings of Lehmann et al and Biskup et al in the manner suggested by the Examiner (i.e., by disregarding Lehmann et al's teaching against the use of the high temperatures of Biskup et al) would "arrive at" a process in which the specific ether diamines of Lehmann et al must be used and the contact time of the gaseous reactants is from 0.5 to 5 seconds.

As has already been discussed, however, Appellants' process is not limited to the Lehmann et al ether diamines. Further, Appellants' process does not limit the contact time of the gaseous reactants. Nonetheless, Appellants' process which does phosgenate ether amines at the high temperatures discouraged by Lehmann et al with contact times longer than the maximum 5 seconds of Biskup et al produces ether (poly)isocyanates in high yield (e.g., yields ranging from 96.8 to 99.5%).

B(2)(c). The teachings of Lehmann et al and Biskup et al can not be combined in any manner which would lead one skilled in the art to expect to obtain the high yields achieved by Appellants' claimed gas phase phosgenation process.

One skilled in the art attempting to phosgenate the Lehmann et al ether amines in the vapor phase (as taught by Biskup et al) would expect to obtain ether isocyanate yields lower than those achieved by Lehmann et al in view of Lehmann et al's teachings with respect to use of elevated temperatures and ether cleavage products.

Contrary to this expectation, Appellants' vapor phase phosgenation process produces ether isocyanates in yields which are significantly higher than those reported by Lehmann et al.

B(3). The combined teachings of Lehmann et al and Bischof et al do not render Appellants' claimed invention obvious.

(a) The teachings of Lehmann et al and Bischof et al would not be combined by those skilled in the art.

Bischof et al discloses a process for the production of aliphatic and cycloaliphatic diisocyanates in which the corresponding diamine is phosgenated in the gaseous phase. Bischof et al does **not** teach or suggest that the disclosed process could be successfully used to phosgenate ether (poly)amines.

Unique problems are encountered in phosgenating ether (poly)amines (as evidenced by the teachings of Lehmann et al). Bischof et al does not address these problems. In fact, Bischof et al does not even mention ether amines.

One skilled in the art seeking to develop a process for the production of ether (poly)amines in high yield would not therefore consider it obvious to combine the teachings of Lehmann et al and Bischof et al in the manner suggested by the Examiner.

B(3)(b). The combined teachings of Lehmann et al and Bischof et al do not result in the process being claimed by Appellants.

One skilled in the art attempting to combine the teachings of Lehmann et al with those of Bischof et al by ignoring Lehmann et al's teaching with respect to high temperatures, would "arrive at" a process limited to the specific diamines required by Lehmann et al. There is no teaching in either reference which would lead one skilled in the art to recognize that limitation to such specific diamines would be unnecessary if the phosgenation process were conducted in the gas phase under the temperature and pressure conditions of Appellants' process.

An invention which does not require the specific materials taught by the prior art to be critical can not be considered obvious in view of that prior art.

The combined teachings of Lehmann et al and Bischof et al do not therefore render Appellants' claimed process obvious.

B.(3)(c) Appellants' process produces ether isocyanates in yields which are significantly higher than those which would have been expected by one skilled in the art combining the teachings of Lehmann et al and Bischof et al in the manner suggested by the Examiner.

One skilled in the art attempting to phosgenate the Lehmann et al ether amines in the vapor phase (as taught by Bischof et al) would expect to obtain ether isocyanate yields lower than those reported by Lehmann et al in view of Lehmann et al's teachings with respect to elevated temperatures and ether cleavage products.

Contrary to this expectation, Appellants' vapor phase phosgenation process produces ether amines in yields which are significantly higher than those reported by Lehmann et al.

B.(4) The teachings of Lehmann et al, Joulak et al, Biskup et al and Bischof et al would not be combined in the manner suggested by the Examiner and do not therefore establish a proper *prima facie* case of obviousness.

The Examiner has argued (at page 5, lines 7-16 of the Final Office Action) that the teaching of the secondary references that vapor phase phosgenation is more efficient and produces higher yields with a variety of different amines as compared with traditional phosgenation provides ample motivation to one of ordinary skill in the art for conducting the phosgenation of ether amines in the vapor phase.

This argument is not, however, consistent with the express teachings of the Lehmann et al reference with which the teachings of those secondary references are being combined.

Lehmann et al teaches that methods for phosgenating amines known in the art were not effective for amines containing ether groups. Lehmann et al teaches that phosgenation at high temperatures will **not** produce the desired ether isocyanates in high yields.

Not one of the cited secondary references rebuts these specific teachings of Lehmann et al. Further, no authority which teaches that Lehmann et al's teachings with respect to ether amines and their sensitivity to high temperatures are erroneous has been cited.

The Examiner has argued that the commercial desirability of a gas phase phosgenation process would lead one skilled in the art to combine the teachings of Lehmann et al with the secondary references.

Appellants submit that this argument does not take into consideration the fact that one skilled in the art reading the reference disclosures would expect gas phase phosgenation of ether amines to produce large quantities of unwanted by-products. Such by-products are clearly not commercially desirable. A process which would be expected to produce such large quantities of unwanted by-products would not therefore be commercially desirable.

In short, The Examiner's argument is **not** supported by the **only** cited reference that is specifically directed to the phosgenation of ether diamines or by any other authority. Such unsupported argument can not provide a proper basis for a rejection under 35 U.S.C. § 103.

IX. CONCLUSION

Appellants' specification discusses the disadvantages of isocyanates having hydrolyzable chlorine contents greater than 0.1% and states that these disadvantages are overcome by the isocyanates produced in accordance with the process of the present invention. Appellants' specification does therefore convey to those skilled in the art that Appellants had invented a process for producing ether isocyanates having hydrolyzable chlorine contents less than 0.1% at the time the application was filed. Appellants have therefore satisfied the description requirement of 35 U.S.C. § 112, first paragraph.

The **only** cited reference which is specifically directed to phosgenation of ether amines (i.e., Lehmann et al) teaches that phosgenation of such amines must be conducted at temperatures lower than those used in vapor phase phosgenation processes. One skilled in the art would not therefore consider it obvious to conduct

phosgenation of such ether amines in the gas phase simply because gas phase phosgenation of other types of amines had been found to be advantageous.

The mere fact that prior art disclosures can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination. In re Imperato, 179 USPQ 730 (CCPA 1973).

In the present case, there is nothing in the cited art to suggest that desirability of vapor phase phosgenation of an ether amine. The suggested combination of Lehmann et al, Joulak et al, Biskup et al and Bischof et al does not therefore establish a proper *prima facie* case of obviousness.

Any combination of the teachings of the cited references would result in a process requiring the specific ether amines taught by Lehmann et al to be critical. Appellants' invention does not require the critical ether amines of Lehmann et al.

The claimed invention can not therefore be considered obvious in view of any combination of the teachings of Lehmann et al, Joulak et al , Biskup et al or Bischof et al.

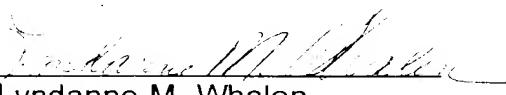
Further, one skilled in the art combining the teachings of the cited disclosures in the manner suggested by the Examiner would expect to obtain the desired ether isocyanate in yields less than those obtained by Lehmann et al's low temperature, liquid phase phosgenation. Contrary to this expectation, Appellants' process produces the desired ether isocyanates in yields which are significantly higher than those obtained by Lehmann et al. Such high yields could not have been predicted from the teachings of the cited references.

Appellants' process which achieves results that could not have been expected from the teachings of the prior art can not be considered obvious in view of the teachings of Lehmann et al in view of Joulak et al, Biskup et al or Bischof et al.

Appellants therefore maintain that each of the Examiner's rejections is in error and respectfully request that each of these rejections be reversed and that Claims 1-4 be allowed.

Respectfully submitted,

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APPENDIX

CLAIMS ON APPEAL

1. A process for the production of an ether (poly)isocyanate from an ether (poly)amine comprising reacting

a) an ether (poly)amine

with at least a stoichiometric amount (based on the number of primary amine groups present in a)) of

b) phosgene or a compound which generates phosgene under the reaction conditions

in the vapor phase at a temperature of from about 50 to about 800°C under pressure.

2. The process of Claim 1 in which ether (poly)amine a) is represented by the formula



in which

X represents H, NH₂ or C(R³)_{4-n}

R¹, R² and R³ each represents an optionally branched, an optionally substituted, or an optionally heteroatom-containing C₁-C₁₀ alkyl, C₃-C₂₄ cycloalkyl, C₇-C₂₄ aralkyl, or a C₆-C₂₄ aryl radical, or a direct bond of X to the ether oxygen atom bonded to R²,

and

n represents 1, 2 or 3.

3. An ether isocyanate selected from the group consisting of 2-(2)isocyanato-propoxy)-1-propyl isocyanate, 1,1'-oxydi-2-propyl isocyanate, 2,2'-oxydi-1-propyl isocyanate and mixtures thereof having a hydrolyzable chlorine content of less than 0.1%.

4. A process for the production of a urethane comprising reacting the ether isocyanate of Claim 3 with an isocyanate-reactive material.